GLACIER COUNTY HAZARD MITIGATION PLAN

Prepared 2003-2005
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1.0 Introduction

The effects from natural and man-made hazards directly impact the safety and well being of Glacier County residents. Historically, drought, floods, severe summer thunderstorms producing hail and tornadoes, harsh winter storms with extreme cold and blizzards, wildfires, windstorms, volcanic ashfall and hazardous material spills have all occurred. Although few of these hazards can be eliminated, the effects from them can be mitigated.

Hazard Mitigation is here defined as any action taken to eliminate or reduce the impact of hazards in terms of human life-safety, property or the natural environment. Hazard Mitigation may take place during any phase of an emergency, and should take place during all three of the commonly identified emergency management phases: preparedness, response and recovery.

Glacier County, working in concert with Pondera County, Toole County, and Liberty County, developed a Pre-Disaster Mitigation (PDM) Plan (hereafter identified as "the Plan") to help guide and focus hazard mitigation activities in the county. The Glacier County Plan profiles significant hazards to the community and identifies mitigation projects that can reduce their impacts. The purpose of the Plan is to promote sound public policy designed to protect citizens, critical facilities, infrastructure, private property, and the environment from natural and manmade hazards. The Plan includes resources and information to assist county residents, organizations, local government, and others interested in participating in planning for natural and man-made hazards. In addition, the plan provides a list of mitigation projects that will assist in reducing risk and preventing loss from future hazard events.

1.1 Authority

The Disaster Mitigation Act (DMA) of 2000 amends the Robert T. Stafford Disaster relief and emergency assistance act by adding a new section, 322 – Mitigation Planning. It requires all local governments to have an approved Pre-Disaster Mitigation Plan in place by November 1, 2003 to be eligible to receive Hazard Mitigation Grant Program project funding.

The Glacier County Commission and the city council of the incorporated city of Cut Bank have adopted this Pre-Disaster Mitigation Plan. These governing bodies have the authority to promote sound public policy regarding natural and man-made hazards. Copies of the signed resolutions from these jurisdictions are included as ***Appendix A*** to this plan. The Plan was adopted at a regularly scheduled meeting of the Cut Bank city council and at a weekly meeting of the Glacier County commissioners, both of which were open to the public and advertised through the communities' typical processes for publicizing public meetings.

The Glacier County Disaster & Emergency Services Coordinator will be responsible for submitting the adopted Plan to the State Hazard Mitigation Office in Helena, Montana. The State Hazard Mitigation Officer will then submit the Plan to the Federal Emergency Management Agency (FEMA) for review. This review will address the federal criteria outlined in FEMA Interim Final Rule 44 CFR Part 201. Upon acceptance by FEMA, Plan signatories will gain eligibility for local mitigation project grants and post-disaster hazard mitigation grant projects (HMGP).

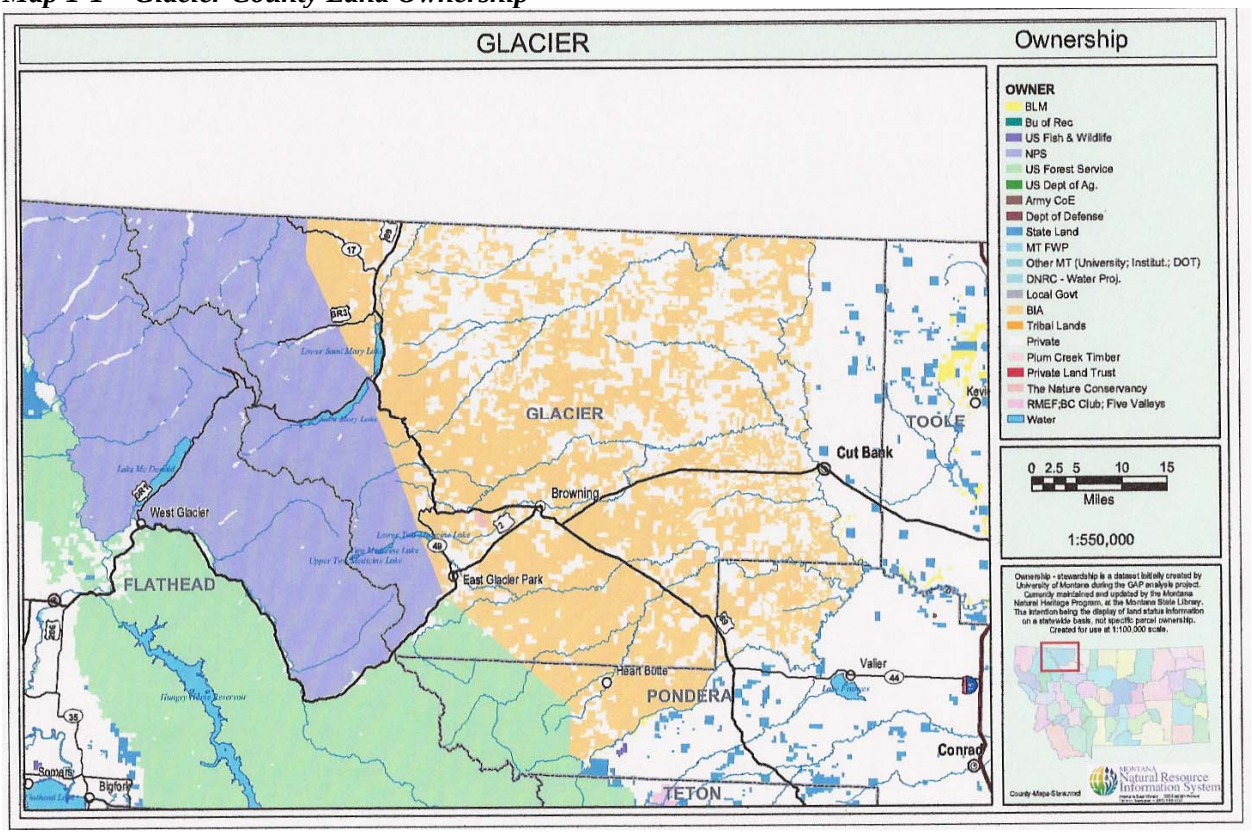
1.2 Acknowledgements

Many groups and individuals have contributed to development of the Glacier County Pre-Disaster Mitigation Plan. The DES Coordinators for Glacier, Pondera, Toole and Liberty Counties, functioning as a steering committee, provided significant guidance and support in all aspects of plan development. The National Weather Service provided historic newspaper accounts of severe weather events and other weather data. Some of the maps included in the plan were provided by the Montana State Library. Numerous elected officials, city and county personnel, and local communities participated in the planning process and contributed significantly to the Plan's development.

1.3 Project Area

Although Glacier County covers 3037.1 square miles, this plan deals with primarily with roughly 20% of that area, mostly on the eastern edge of the county. This is because the Blackfeet Indian Nation, most of which is located in Glacier County, covers 80% of the county's land area as sown in ***Map 1-1***. The county commission has no jurisdiction over that part of the county, so this plan will consider only the non-reservation lands.

Map 1-1 Glacier County Land Ownership



Glacier County is a rural agricultural county with a population of 13,247 residents (according to the 2000 census), making it the 13th most populous county in Montana. Of these, 5,061 live on non-tribal lands. There is one incorporated city within the county (and not part of the Blackfeet Nation). Cut Bank has a population of 3,105. There are also a number of small, unincorporated communities, including the town sites of Babb, Blackfoot, East Glacier, Santa Rita and St. Mary. Another incorporated city, Browning, lies within the Blackfeet Nation.

Altitude varies from 10,438 feet at the peak of Mt. Cleveland to less than 4,000 feet in the eastern end of the county. Cut Bank sits at 3,800 feet above sea level.

Highway 2, a major transportation route, from east to west, runs directly through the middle of the county and the cities of Cut Bank and Browning, and Highway 89 runs across the county from north to south. The Burlington Northern Santa Fe railroad also runs east-west through the county and the cities of Cut Bank, Browning and East Glacier. It includes the two highest railroad trestles in the state, and passenger service is offered once per day.

The eastern part of the county is home to vast oil and gas fields and a gas refining plant, and is crisscrossed with oil and gas pipelines. Accordingly, many and varied chemicals which are used in the industry are stored throughout the county. There is also limited use of radiologic devices in the oil fields.

Because of the extensive agricultural industry in the county, there are many and varied stores of fertilizers, pesticides, herbicides and other ag-related chemicals.

Its close proximity to Glacier National Park means that Glacier County plays host to a large number of tourists from all over the world. Tourist season peaks in the summer months of June and July, but many tourists can be found in the county during any time of the year.

1.4 Economy

Agriculture (small grains and cattle), is the largest income-producing segment of the Glacier County economy. Government and the Northern Rockies Medical Center are the largest non-agricultural employers in the county. Information obtained from the 2000 US Census shows the median household income during 1999 at $27,921, and the per capita income at $11,597. The percentage of those living below the poverty level during this time was 27.3% for Glacier County as opposed to 14.65% for the state as a whole. According to the U.S. Census Bureau, average unemployment for the County was 9.5% during 2000.

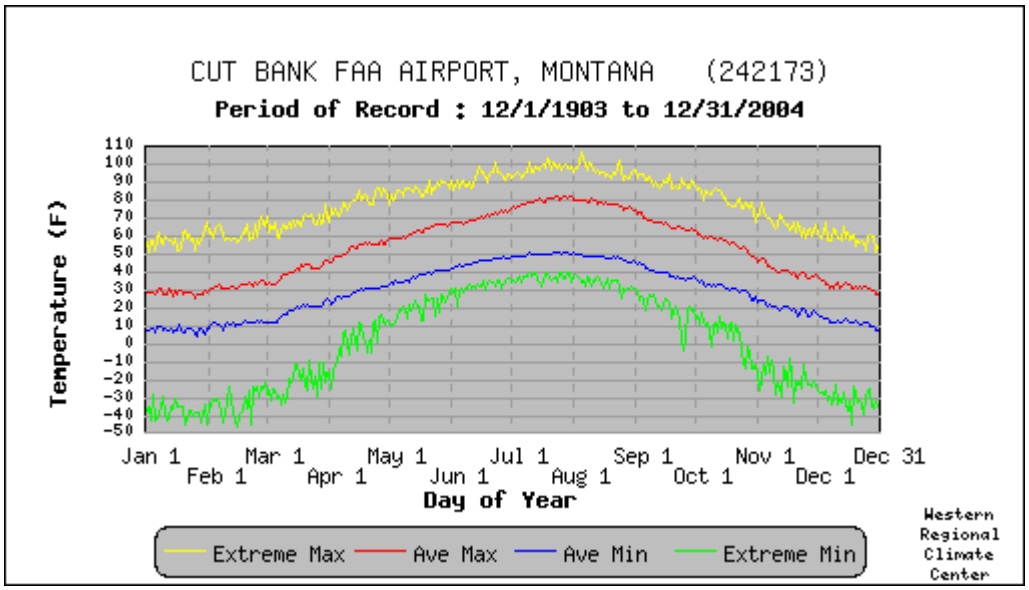
1.5 Climate and Weather

Glacier County is located within the region generally classified as dry continental or steppe, with four well-defined seasons. This area of north central Montana is located in an extremely active weather zone. During the severe summer weather season, typically June through August, there are numerous severe thunderstorms that produce large hail, damaging winds and tornadoes. November through March, this area is susceptible to extreme winter weather and prolonged and severe wind events.

The average high and low temperatures in January are 7 and 28 degrees Fahrenheit. Average high and low temperatures in July are 80 and 50 degrees Fahrenheit, respectively. Averages are fairly uniform across the county.

Graph 1-1 shows the extreme maximum and minimum temperatures as well as the average maximum and minimum temperatures for each day from December 1903 to December 2004. This information is obtained from the reporting station at Cut Bank.

Graph 1-1 Extreme Maximum and Minimum Temperatures – Cut Bank Reporting Station

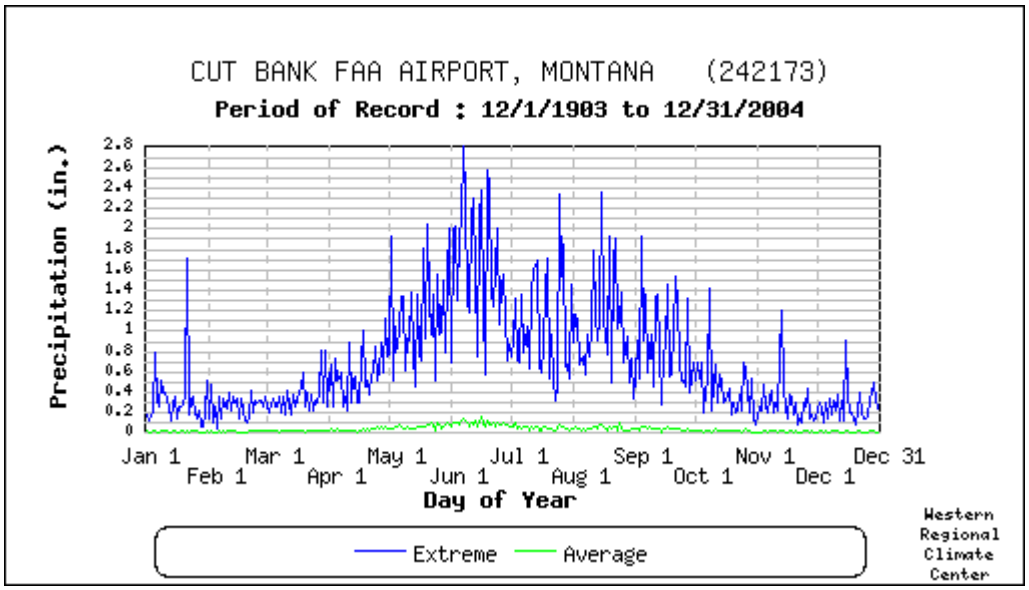


Annual average precipitation is only 13 inches in Glacier County. Because of the Rocky Mountains, the western portion of the county receives a greater average amount of precipitation than the east. Approximately 70% of the precipitation occurs from May through September. Precipitation can vary significantly from year to year, and location to location within a given year. October through March is, on average, quite dry with the mean monthly precipitation of 0.50 inches or less. The most intense precipitation often occurs with localized downpours associated with thunderstorms in June through August. Flash flooding has resulted from these downpours with over 3 inches of precipitation reported in a few events.

Severe thunderstorms are common from June into early September. The greatest hazards typically associated with these thunderstorms are very high winds and large hail. Damage to structures and crops occur regularly from these storms. Funnel clouds have been reported, but are relatively rare.

Graph 1-2 provides information on extreme and average precipitation recorded for each day of the year the Cut Bank reporting station.

Graph 1-2 Extreme and Average Precipitation – Cut Bank Reporting Station



Average yearly snowfall is 33.8 inches. Almost all the snow falls from November to April, but snowstorms have been known to occur in every month except July. The early and late season storms can produce large quantities of snow and are often made more severe when temperatures are warmer, and the snow is heavier and moister, making travel and snow removal very difficult. Snowstorms in the county are often accompanied by high winds, resulting in blizzard conditions. In spring, these storms can coincide with the calving season resulting in livestock loss. Mid winter snowstorms, in general, produce less than 6 inches of snow, but amounts to 10 inches or more have occurred. In part because of the generally lighter and drier snow often seen in mid-winter months, high winds can easily result in blizzard conditions in those months. Even without falling snow, in cold conditions high winds can pick up loose snow, resulting in local ground blizzards.

Graph 1-3 provides information on the extreme and average snowfall recorded at the Cut Bank reporting station.

Graph 1-3 Extreme and Average Snowfall – Cut Bank Reporting Station

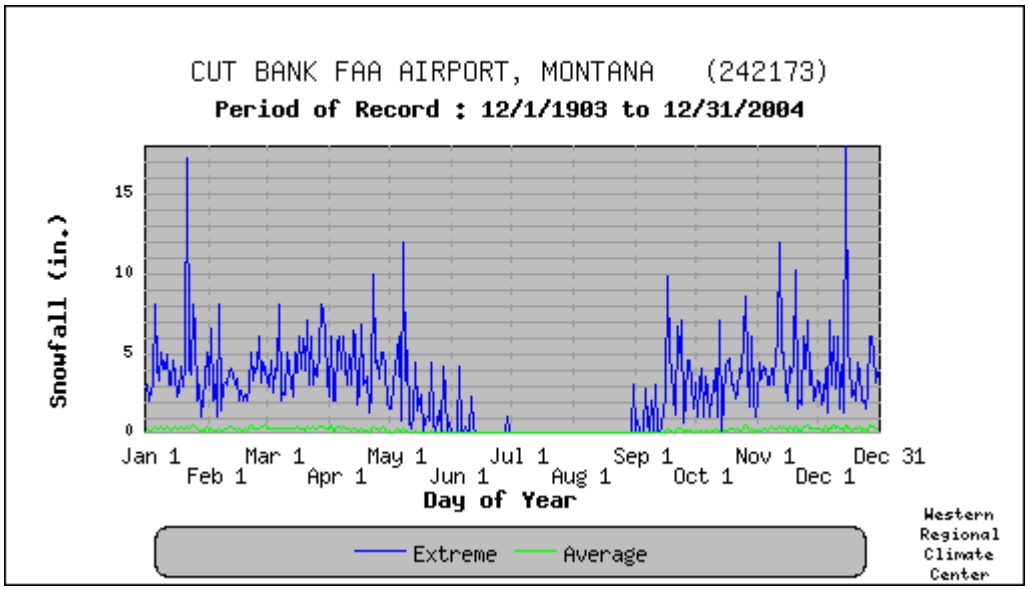


Table 1-1 details the top weather events recorded by the NWS at the Cut Bank reporting station.

Top Weather Events – Cut Bank, MT March 1911 - March 2003					
Hottest Day		Coldest Day		Most Precipitation Day	
107	08/15/1961	-47	02/15/1936	2.80 inches	06/07/1924
103	07/19/1960	-46	01/31/1962	2.57 inches	06/19/1975
103	08/06/1983	-46	12/05/1939	2.42 inches	06/20/1991
102	08/24/1930	-45	01/20/1984	2.30 inches	06/09/2002
Most Precipitation /Year		Least Precipitation/Year		Greatest Snowfall/Day	
23.34 inches	1975	3.50 inches	1990	10.2 inches	12/20/1970
18.01 inches	1942	4.25 inches	1935	17.2 inches	01/20/1943
16.50 inches	1925	1.37 inches	1920	12.0 inches	11/12/1930
17.25 inches	1924	4.66 inches	1918	18.0 inches	12/15/1924

An important element of the climate in Glacier County is the wind. Glacier County lies within the Chinook zone, which is associated with 160 mph wind speeds. Chinook winds, known elsewhere as Santa Anas or Sirroccos, during the winter and early spring can lead to significant snow melt and flooding of small streams and rivers. Average wind speeds range from 10 to 15 mph depending on the exposure of the location. The average and peak sustained winds tend to be stronger over higher, more exposed terrain and areas below steep canyons. The high wind gusts often occur with thunderstorms during the summer, with gusts over 60 mph occurring every year. The highest sustained winds tend to occur in the spring and fall, when long-lasting Chinook events are most likely to occur.

1.6 Scope and Organization

The scope of the Glacier County Pre-Disaster Mitigation Plan includes the following:

- Identify and prioritize disaster events that are most probable and destructive
- Identify critical facilities
- Identify areas within the community that are most vulnerable
- Develop goals for reducing the effects of a disaster event
- Develop specific projects to be implemented for each goal
- Outline process for official adoption of the Plan.

The Glacier County Mitigation Plan is divided into six sections, plus supporting materials in the appendixes. Section 1 gives an introduction to the plan and to Glacier County. Section 2 offers an overview of the planning process in Glacier County and discusses the approach taken by mitigation planning officials. It also identifies principal individuals, groups and agencies in the process and their specific responsibilities and explains how mitigation projects will be selected; it focuses on process, not product, and should serve to guide the county's mitigation efforts.

Section 3 summarizes the hazard and vulnerability analysis performed by the county. As well as an explanation of the how the information was gathered, this section will present a detailed account of the hazards in the county, including statistical data on the financial risks posed by the various hazards.

In 4, the county will outline its mitigation strategy. While it cannot approach comprehensiveness in its identification of measures to be taken by the county and by various agencies, it will set mitigation planning in motion by offering recommendations of the kinds of practices that will be put into place. Goals and objectives will be listed, followed by prioritized mitigation projects the Mitigation Planning Steering Committee hopes to undertake.

Plan Maintenance Procedures are described in Section 5.

2.0 Hazard Mitigation Overview & Planning Process

As defined above, hazard mitigation is something done to decrease the risks imposed by a hazard. Like the planning element of emergency management, mitigation is ideally an ongoing process, taking place before, during and after a disaster. A mitigation plan should be a living document, changing with the hazard and financial situation of the jurisdiction, keeping pace with legislation, and taking into account lessons learned from exercises and incidents.

2.1 Hazard Mitigation Approach

The county hopes to become more disaster-resistant as a result of the mitigation process. Mitigation strategies will therefore seek to reduce loss of life and property and the time necessary for recovery from an incident.

The county's perspective on mitigation planning was shaped to a large degree by Federal Emergency Management Agency recommendations and suggestions from Montana Disaster and Emergency Services. Much of the process and many planning tools and worksheets used were from the FEMA "State and Local Mitigation Planning How-To Guide."

2.1.1 Steering Committee

The Mitigation Steering Committee is a group of emergency managers who are simultaneously writing mitigation plans in their respective jurisdictions. The Steering Committee is a forum in which these emergency managers can share ideas, review each others' plans, and assist one another as they organize mitigation planning efforts in their own counties. A membership and contact list for the Steering Committee is included in ***Appendix B***.

2.1.2 Mitigation Planning Committees

Without support from the community, significant mitigation projects are usually doomed to failure. The county and the Steering Committee recognized from the beginning that any large-scale or long-term attempts at mitigation must be based in the real and perceived needs and goals of the community. This implies several points about mitigation planning that the County took into account when beginning the planning process:

1. As the county wishes to develop both large-scale and long-term mitigation projects, public participation is a must.
2. The public will only support projects that they perceive to be useful and aligned with larger community goals.
3. Research must be done to ensure that needs perceived by the public are indeed real and that addressing them would truly benefit the community (i.e. hazard analysis).
4. Mitigation planners must take care that the actions they select mesh with the vision the community harbors for itself.

Toward this end, Glacier County Disaster and Emergency Services (hereafter "DES"), the leading player in mitigation planning in the county, formed a Mitigation Planning Committee (hereafter "the Planning Committee"). The individuals selected to participate were chosen with two factors in mind:

1) community leaders should be involved in the planning process, and 2) a wide cross-section of interests should be represented. Examples of parties asked to participate include elected officials, first responders from all disciplines, local and state governmental agencies, utilities, volunteer organizations, and major businesses in the community. For a full list of individuals and agencies involved, see Appendix B.

2.1.3 Public Meetings

After the decision to begin the mitigation planning process, all decisions made by the Mitigation Planning Committee were made in formal public meetings, advertised in the local media and open to any who wished to attend.

Documentation from all of these meetings, including press releases, sign-in sheets and meeting minutes, is included in ***Appendix C***.

2.2 The Planning Process

The mitigation planning process pursued by the county included five steps. These include: hazard analysis, goal formulation, alternative action identification, prioritization of action steps, and implementation of selected projects. These are covered in more detail below.

2.2.1 Hazard Analysis

During the summer of 2003, a detailed hazard analysis was conducted by the county. Contractors were hired to review local media reserves, GIS data sources, National Weather Service information, oral histories by local residents, and any other information sources they could find to formulate detailed descriptions of local hazards and the county's vulnerability to those hazards. The assessment also identified critical facilities and vulnerable populations.

The Mitigation Steering Committee provided guidance to the contractors throughout their tenure, and assisted in the identification of local information outlets. Where possible, the hazard and risk information was sorted and refined for each of the three zones of the county as identified in Map 2.1.

The information gathered during the hazard assessment was recorded and condensed onto worksheets provided in FEMA's "State and Local Mitigation Planning How-To Guide," and finally provided to the Steering Committee to be presented to the Planning Committee in public meetings. (The worksheets are included in Appendix D.) The Steering Committee distilled the information in the hazard assessment into nine problem statements that succinctly describe the main hazards the county faces.

2.2.2 Goals and Objectives

In autumn of 2003 the results of the hazard analysis were presented to the Glacier County Mitigation Planning Committee. The problem statements were included in this presentation, and the Planning Committee discussed them in some depth. In this meeting, open to the public, the Planning Committee debated which hazards should be given top priority.

Based on the above discussion, the Planning Committee came up with a list of mitigation goals (included in section 4.1). Each goal was based on one or more hazards identified in the risk assessment and summarized in the problem statements. The goals are broad, visionary, forward-looking statements and

outline in general terms what the Planning Committee would like to accomplish. Goals are usually not measurable or fully attainable, but rather ideals to which the Planning Committee and the County should refer as they are developing their mitigation projects.

For each goal, the Planning Committee developed one or more objectives. Objectives should be clear and measurable benchmarks the County would hope to reach en route to the goal. They must be realistic and fully attainable, and will generally include a time frame during which they should be completed. The objectives listed by the Planning Committee are included in section 4.1 of this plan.

At a later meeting, and after a reasonable period of time for consideration, members of the Planning Committee ranked the goals, paired with their objectives, according to which offered the most benefits to the county for the least outlay of time and money. This ranking is subjective, but it reflects the concerns of the community.

Goals will be reexamined periodically to ensure that they still address important hazards faced by the county and that they are still prioritized in a reasonable fashion. Objectives will be assessed more frequently and progress towards them noted. As objectives are accomplished, new ones will be written by the Planning Committee. See section 5.1 for more information on plan maintenance issues.

2.2.3 Action Steps

For each of the objectives developed by the Planning Committee, the Steering Committee developed a list of possible action steps—essentially mitigation projects—that could realistically be implemented by the County. When generating these lists, the following guidelines were kept in mind by the Steering Committee:

- A variety of approaches and mitigation techniques should be represented.
- Actions should work towards listed objectives.
- Listed actions should be realistic and practical.
- Options of varying scale and scope should be listed.

The Planning Committee then selected and prioritized mitigation action steps. In this process, weight was to be given to meeting the objectives to the greatest extent possible. Some action steps even address multiple objectives. It is understood and accepted that some mitigation actions will be much more easily and inexpensively implemented than others; this will be taken into account at the next step in the process. (Note: Mitigation action steps selected by the Planning Committee can be found, in order of their priority, in section 4.2.)

2.2.4 Implementation

The ultimate phase of the mitigation process is implementation of mitigation actions according to the list prioritized by the Planning Committee. This step, initiated by DES, will ideally include the efforts of the entire community.

If mitigation actions given high priority can be realized with little or no monetary resources on the part of the County, DES should begin work on them as soon as they can do so. For example, if one of the priorities would be to enhance community awareness of windstorm events, DES might put out brochures,

go on a radio program to speak about the dangers of wind, place information in a local newspaper, or speak or have a booth at a local event, such as a county fair.

In the case of mitigation activities that require affiliation with and effort on the part of other agencies, DES, with the assistance of one or more members of the Planning Committee, will work with those agencies and advise them on mitigation tasks. Should one of those agencies request it, a public meeting with the Planning Committee will be held to discuss the recommended mitigation actions and alternatives.

Some mitigation actions will cost more, in both money and time, than others. DES and the Planning Committee will continually look for mitigation grants and other monies that might be available for mitigation projects. As money becomes available, mitigation activities will be completed in the order they have been prioritized.

2.3 Organization and Assignment of Responsibilities

As a conclusion to the "process" section of this plan, we include here the responsibilities of each group or agency as identified above. This is meant to serve as a reference to anyone wishing to review his or her responsibilities, and can be used as a summary of the mitigation planning process in Glacier County.

Steering Committee

1. Oversee the planning process
2. Write and maintain the County Mitigation Plan
3. Ensure all mitigation planning and actions compliment state goals and objectives
4. Organize, schedule and facilitate Planning Committee meetings
5. Research and present hazard analysis
6. Research and present possible mitigation actions

Mitigation Planning Committee

1. Work with DES & the Steering Committee throughout the planning process
2. Identify hazards that threaten the jurisdiction
3. Prioritize hazards, goals, objectives and action steps
4. Select most reasonable mitigation measures for the County
5. Develop and implement goals and objectives
6. Encourage and provide methodology for public input
7. Evaluate mitigation activities

Disaster & Emergency Services

1. Serve on the Mitigation Steering Committee
2. Coordinate with state DES for mitigation resources
3. Carry out mitigation activities

3.0 Hazard Evaluation and Risk Assessment

Before considering any specific mitigation activities, the county must fully understand the hazards to which it is exposed. It was a responsibility of the Planning Committee, with the guidance of DES, to identify hazards that threaten parts, or all, of the jurisdiction. The hazards identified by the Planning Committee and DES (listed below) were studied in depth in the summer of 2003. The goal of the assessment was to determine which hazards present the greatest risk and what areas are most vulnerable to the hazards.

Information for the hazard assessment was taken from a number of sources. These include input from locals; historical records from Glacier County, the National Weather Service, and various other government agencies; and local media sources (i.e. newspapers). This information, condensed into hazard profiles, will be presented in Section 3.1.

Once a clear picture of the hazards was obtained, local vulnerabilities were identified and calculated. These included analysis of the values of structures on various land parcels, identification of critical facilities and infrastructure, review of local growth and land use trends, and listing of vulnerable populations in our area (Section 3.2).

The information from the hazard analysis and vulnerability study were combined to come up with the information in Sections 3.3 and 3.4. Where possible, we have included estimates of potential losses from the hazards and calculations of the risks the county faces. (For some hazards, no historical data was available to provide numerical estimates. Because our own guesses would have such a large margin of error, they would be statistically meaningless and were therefore not included here.)

The problem statements presented to the Mitigation Planning Committee in the fall of 2003 complete Section 3.

3.1 Local Historical Profiles

Hazard profiles include, where possible, historical data and predicted hazard frequency, potential intensity and damage, location, probable extent, duration, seasonal pattern, speed of onset and availability of warnings. After gathering this data, DES will condense the information into problem statements to allow for easier comprehension and processing of the large body of data. The Mitigation Planning Committee identified many potential hazards the county might face. What follows are profiles of the 11 greatest hazards to Glacier County as identified by the Mitigation Planning Committee.

3.1.1 Dam Failure

General

Dams are used throughout the area for flood control, fire protection, irrigation, and stock watering. These dams are classified by Montana's Department of Natural Resources and Conservation (DNRC) in terms of likely damage resulting from a breach. The classification systems is as follows: "high" – significant loss of life and property; "significant" – no loss of life but major property damage; and "low" – minor property damage. These classifications are analogous to the Army Corps of Engineers system, with "high" being designated as "Category I," "significant" as "Category II," and "low" as "Category III."

Failures of dams are often the result of other events, such as earthquakes or major storms. In Glacier County, a dam break would likely occur when spring rainstorms coincided with warm weather that quickly melts mountain snowpack.

The three dams located in Glacier County are within the confines of the Blackfeet Reservation. Lake Sherburne/Swift Current Dam and Two Medicine Dam are classified as Category I dams. Swift Current flows north to the St. Mary's River then into Canada. The Two Medicine flow east into the Two Medicine River and Birch Creek , the joins the Cut Bank Creek to form the headwater of the Marias River.

Previous Occurrences
The greatest historical loss in the county was the failure of Two Medicine Dam in 1964, which caused 15 deaths and damages near two million. We could expect that figure to be higher if a similar event were to happen today.

No other dam failures were found to have occurred in the county.

Vulnerability
A dam failure in the county would threaten all of the Two Medicine Valley as well as Highway 89 and other paved and unpaved roads. A Swift Current Dam failure would profoundly affect the village of Babb and Highway 89.

3.1.2 Drought

General
Drought is an extended period of abnormally dry weather. Unlike other disasters, drought has a very slow onset and therefore can be treated differently. It does not require immediate response and does not constitute an immediate threat to life or property. The basic effect of drought is economic hardship, but it does resemble other disasters in that its victims can be deprived of their livelihoods and communities can suffer from an economic decline.

The effects of drought become more apparent with a longer duration because more and more moisture-related activities are affected. Non-irrigated croplands and rangelands are most susceptible to moisture shortages. Irrigated agricultural lands do not feel the effects as quickly, but their yields can also be greatly reduced.

In periods of severe drought, soil erosion can become a major issue and insect infestations are exacerbated. Wildfires are also more of a problem during droughts, and in extreme drought conditions, lakes, reservoirs and rivers can be subject to severe water shortages.

Previous Occurrences
Because drought is defined very differently by different agencies or resources, and because drought has a slow onset, it was difficult to develop a comprehensive list of drought events and dates. Nevertheless, historical sources consistently recognize that precipitation patterns in the county are very inconsistent and it is common to have years in which rainfall is substantially less than normal, resulting in severe economic losses to the county's largely agriculture-based economy.

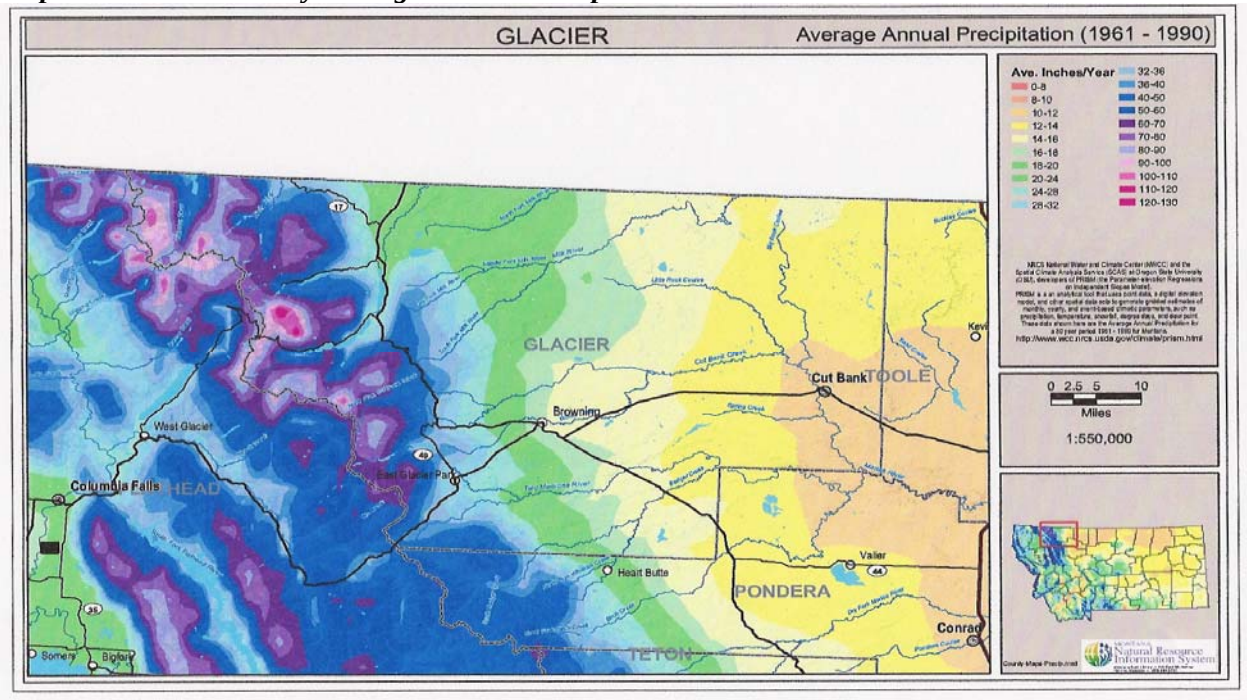
By nearly all measures, Glacier County has experienced drought five of the last eight years. It is difficult to know the exact economic losses due to drought, but it is easily in the millions each year of severe drought. One Farm Service Agency report lists $44 million in crop losses in 2001, though the report specifies that it was not clear exactly how much of those losses was due to the drought.

Vulnerability

It is very likely that drought will occur in Glacier County. This area has a history of periodic droughts, and they have the potential to cost the County heavily in economic resources.

Map 3-1 shows average annual precipitation over Glacier County. One can see that the eastern end of the County, with which this plan is concerned, gets significantly less than areas closer to the divide (on the western end). end of the county gets much more precipitation and is therefore slightly less susceptible to drought than the eastern end.

Map 3-1 Glacier County Average Annual Precipitation



Because drought's main effects are felt on agricultural industries, the Cut Bank is not likely to experience any direct effects of drought. Because the town's economy relies heavily on surrounding farms and ranches, however, economic losses from drought will certainly have some affect on the Cut Bank indirectly.

3.1.3 Earthquake

General

An earthquake is a trembling of the ground that results from the sudden shifting of rock beneath the earth's crust. Earthquakes may cause landslides and rupture dams. Severe earthquakes can destroy roads, telephone lines, water mains, and gas and sewer lines, which may, in turn, set off fires and/or hinder firefighting or rescue efforts. Earthquakes may also cause buildings and bridges to collapse.

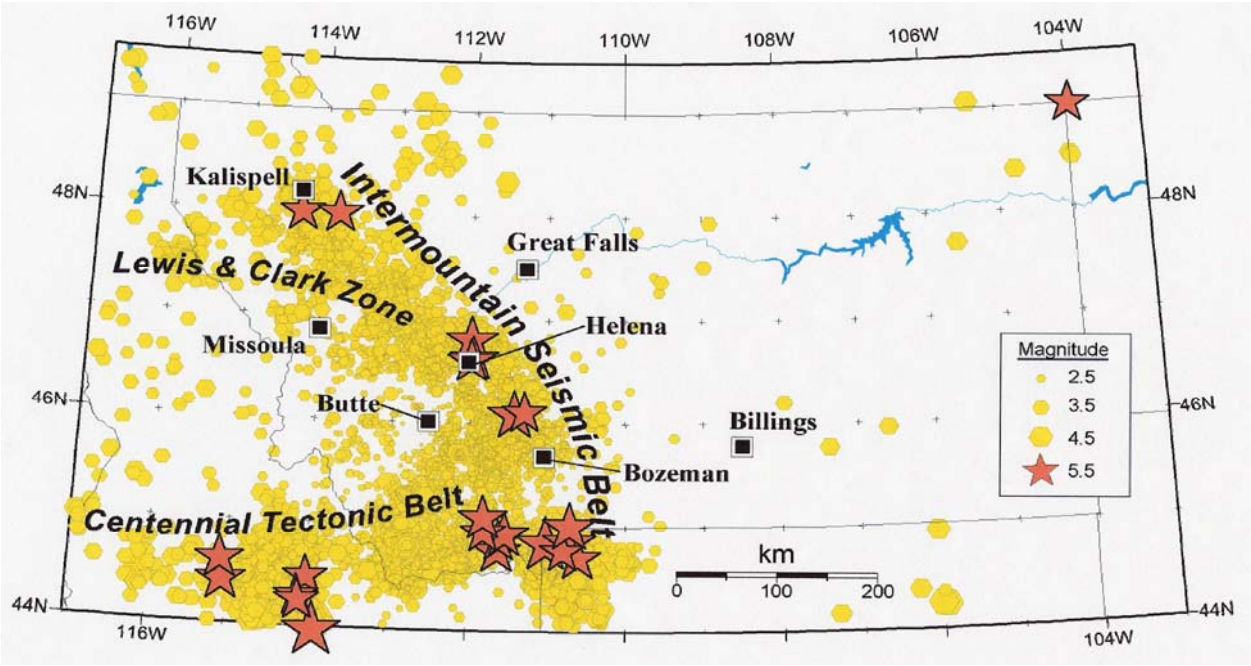
Earthquakes occur along faults, which are fractures or fracture zones in the earth across which there may be relative motion. The western border of the county is the Continental Divide (formed by the movement of plates of rock). There are also some major intersecting faults in Flathead County, which borders Glacier County to the west; the western end of the county is therefore more seismically active than Cut Bank and the eastern parts of the county.

Previous Occurrences

Historical sources record six earthquakes that have occurred in Glacier County, and some major earthquakes to the west and south have caused damage in Cut Bank and elsewhere in the county. One 1935 series of three earthquakes killed 2 and injured 15 in Helena, where they caused major damage. Only mirror damage was recorded in Cut Bank.

Map 3-2 shows the locations and magnitudes of recorded earthquakes around Montana, many of which were likely felt in Cut Bank but not recorded.

Map 3-2 Montana Earthquake Locations and Magnitudes



Vulnerability
The County is at risk of damage by major earthquakes, but the likelihood of such an event's occurrence is low. Minor earthquakes, on the other hand, are fairly likely. A major earthquake would have the potential to cause millions of dollars in damage and many deaths, but it is impossible to make accurate predictions because the amount of damage would be dependent entirely on the severity and epicenter of the event. Because of the locations of fault lines, western parts of the county are more at risk.

3.1.4 Floods

General
Floods are natural events for rivers or streams. Excess water from snowmelt and rainfall accumulates and overflows onto the banks and adjacent floodplains. Floodplains are lowlands adjacent to rivers and lakes that are subject to recurring floods. Rapid snowmelts are often the cause of floods in Glacier County. A flash flood is a flood that occurs without warning and is generally the result of a torrential rain or cloudburst over a relatively small drainage area.

Hundreds of significant floods occur in the United States each year and kill an average of 150 people annually nationwide. Flooding is one of the most common hazards in the country and in Montana, and is the most deadly natural hazard both nationwide and in Montana. Most injuries and deaths occur when people are swept away by flood currents and most property damage results from inundation by sediment-laden water. Fast-moving floodwater can wash buildings off their foundations and sweep vehicles downstream. Pipelines, bridges, and other infrastructure can be damaged when high water combines with flood debris. Basement flooding can cause extensive damage.

Most of Glacier County has not been mapped for floods, and there are no designated floodplains in the County.

Previous Occurrences
Minor flooding happens frequently in Cut Bank and other parts of the county (about every three years, on average), and major flooding tends to occur about once every ten years. Eleven major floods were covered by local newspapers since 1934, the worst of which occurred in 1964. In two floods that occurred in ten days in June 15 people are known to have died while another 36 went missing. Over $2.5 million damage occurred to roads and bridges, houses and other buildings, livestock and crop loss, machinery, and livestock feed..

Vulnerability
Glacier County and Cut Bank are very likely to receive damage by future floods. Fast-moving and high waters and excessive rains will probably happen two or three times each decade, washing out roads and crops, and occasionally causing injuries or deaths.

3.1.5 Hailstorms

General
A hailstorm is a thunderstorm from which hailstones (balls of ice) fall to the ground. Strong winds high up in the stormclouds keep the hailstones suspended as they grow; therefore, storms with stronger updrafts often produce larger hail. Hailstones can sometimes reach the size of softballs, though this is rare. While they most often occur in spring and early summer, hailstorms can occur in any season.

Hailstones can cause injuries and, very rarely, deaths to unprotected people and animals. Much more common is property damage. Windows can be broken in houses and cars, and cars and other metal objects can be badly dented. Perhaps most significant to Montana, hailstorms can devastate crops and rangeland, sometimes completely destroying the vegetation in a given area.

Previous Occurences
According to historical records, hailstorms have caused more economic damage in Glacier County than any other hazard. Almost every summer sees at least a little hail, with economic damage occurring about once every two years. It is not uncommon for one hailstorm to cause more than $1 million damage to crops and property in just a few minutes; the most damaging recorded hailstorm, in August of 1978, resulted in more than $8 million in crop losses.

Vulnerability
Hailstorms are likely to occur in Glacier County, and the entire county, including Cut Bank, is equally susceptible to them. Because rural parts of the county can sustain hundreds of thousands of dollars in crop losses in a very short time, the county is more likely to suffer economic damages from hailstorms than the City of Cut Bank. Although it is not likely that human or animal deaths or serious injuries will occur from hail in any given year, this is a possibility and does happen on occasion.

3.1.6 Landslides

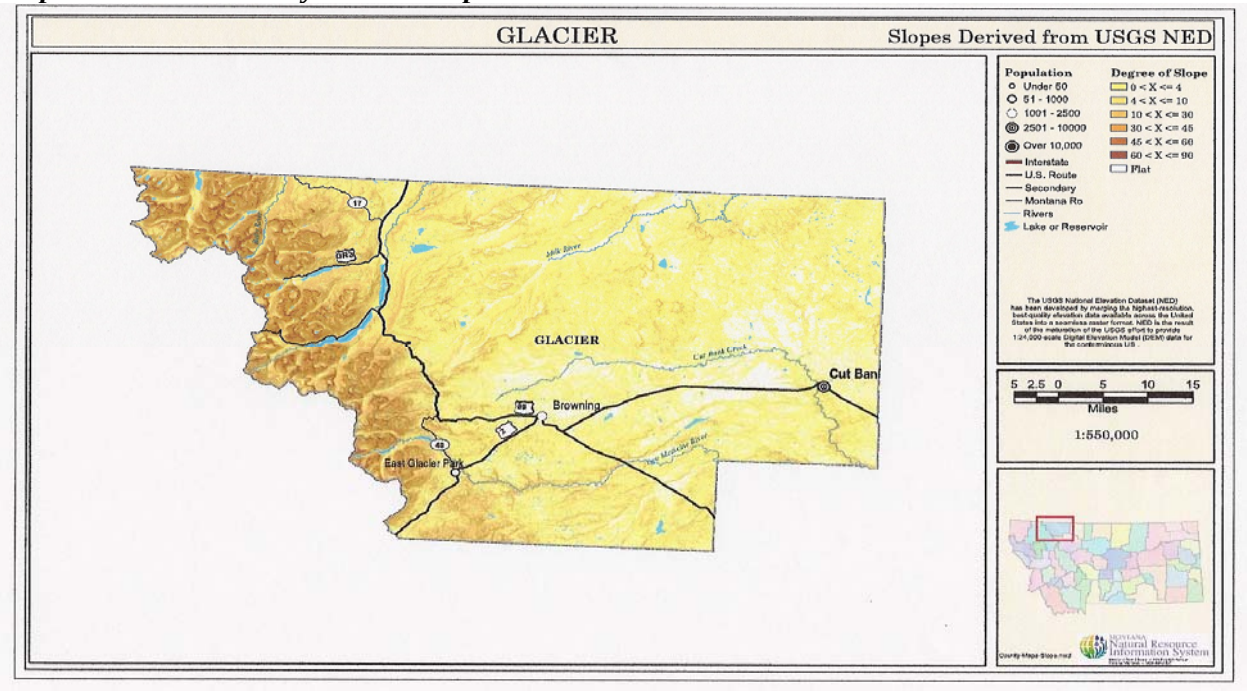
General
Landslides are large movements of dirt, rock or mud down a slope. They often occur as a result of earthquakes or heavy rains. Areas that have been burned by wildfires or eroded for some other reason are particularly vulnerable to landslides.

In a populated area, landslides can be incredibly dangerous, burying or destroying people, cars and structures. Landslides can also block or destroy roads and raze power lines or other infrastructure. Occasionally they can also block passage of rivers or streams, resulting in flooding.

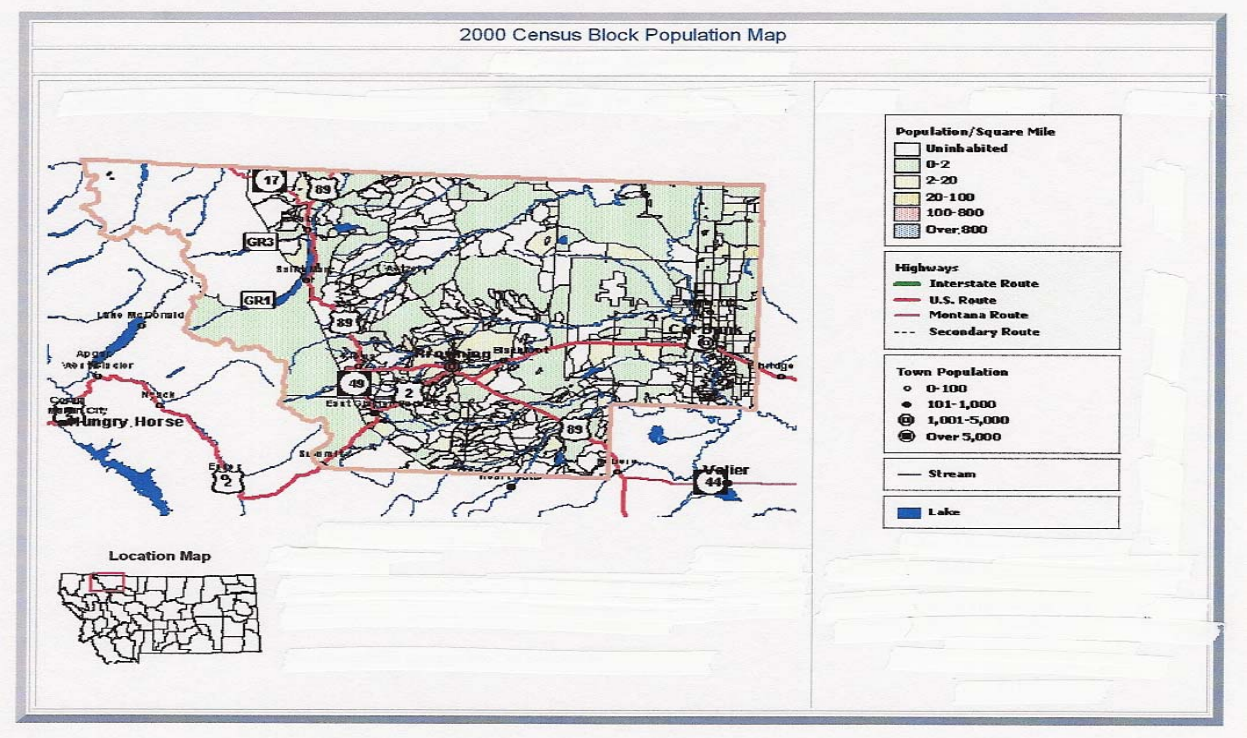
Previous Occurrences
We found no records of landslides having occurred in Glacier County.

Vulnerability
Landslides are not likely to occur in the County, and they are even less likely to cause large amounts of damage. Because of its geography, Cut Bank is at no risk from landslides. Still, there is some chance of their happening in the western end of the county, where slopes are more substantial. ***Map 3-3*** shows the average slopes throughout the county. By comparing this with ***Map 3-4***, which shows population density, one can see that the part of the County with major slopes is almost entirely uninhabited.

Map 3-3 Glacier County Ground Slope



Map 3-4 Glacier County Population Density



3.1.7 Severe Winter Storms

General
Winter storms occur from autumn to late spring, with the most severe snowfall coming in two periods: from October-November and from February-March. These storms have the potential to destroy property and kill people and livestock. Winter storms can include sleet, ice storms or freezing rain, heavy snowfall or blizzards. Blizzards can occur with or without snowfall, and are characterized by low visibility caused by high winds and blowing snow.

A severe winter storm is generally a prolonged event involving snow or ice and extreme cold. The characteristics of severe winter storms are determined by the amount and extent of snow or ice, air temperature, wind speed, and event duration. Severe winter storms create conditions that disrupt essential regional systems such as public utilities, telecommunications, and transportation routes. Ice storms accompanied by high winds can have devastating impacts, especially to trees, power lines and utility services.

Winter storms are frequently the precursors to spring flooding; the more snow, the better the chances of floods if a quick warm-up occurs. Any snowfall over 4 inches is likely to have an effect on both property and lives in Glacier County, as well as Cut Bank, as snow frequently combines with winds to produce blizzards.

Previous Occurrences
We found records of 34 severe winter storms that caused damages, deaths or injuries in the County though it is believed that more deaths have occurred due to winter storms than were reported. (Winter storms are an almost yearly occurrence, and traffic deaths caused by severe winter weather and ice storms are often not attributed to the storms themselves.)

In the past, severe winter storms and snowstorms have caused often caused more than $100,000 in damages and killed hundreds of livestock, as well as closed roads, caused electrical blackouts, and played a part in many traffic deaths. Major winter storms have occurred in every month but July and August with the worst recent winter storm occurring in June of 2002. It killed 3,700 head of livestock, topped $1.5 million in damages, and closed roads and put out power for several days.

Vulnerability
Map 3-1, which illustrates average precipitation over the County, also demonstrates where the most snowfall usually occurs. The western end of the county is obviously most susceptible to severe snowstorms and blizzards; all of the County and the two included cities are equally at risk of ice storms, wind and extreme cold.

3.1.8 Tornadoes and Microbursts

General
Tornadoes are funnels of wind that can reach speeds of 250 miles per hour (though such speeds are not known to occur in Montana). These strong winds can throw heavy debris at high speeds, demolish structures, and destroy power lines and other infrastructure.

Microbursts are bursts of air caused by bubbles of air at high altitudes with a very different pressure from the lower atmosphere. These smash into the ground at high speeds, radiating debris in all directions. Microbursts can break off trees, kill crops, damage or destroy structures, and injure people or animals near the site of the downburst.

Previous Occurrences
Though they are not common, tornadoes and microbursts have destroyed buildings and crops and resulted in a number of injuries on several occasions in Glacier County. In July 1998 a tornado destroyed the grandstands and horse barns at the Saddle Club. (No estimate on financial values was listed.) It is fair to assume that a major tornado hitting Cut Bank could cause millions of dollars damage with some loss of life.

Vulnerability
Both tornadoes and microbursts occur most often in the spring, though they can occur in any season. All parts of the County, including Cut Bank, are equally susceptible to these hazards. Because they have occurred infrequently in the past, it is difficult to quantify the exact likelihood that they will occur in a given year. As there are multiple reports of both tornadoes and microbursts having happened in the last 40 years, however, it is safe to assume that there is some chance of them affecting Cut Bank or other part of the County.

3.1.9 Volcanic Ash Fall

General
In a volcanic eruption, large amounts of volcanic ash are ejected into the air. This ash settles over a very large area and causes a number of problems. Because it is so fine, it is easily inhaled and can cause severe health problems. When it falls out with rain, a mild acid is formed that can be destructive to automobiles and other painted objects and can cause widespread crop damage. Perhaps most destructive, however, is the sheer weight of ash that sometimes accumulates. Volcanic ash is incredibly heavy and can cause roofs of buildings to collapse.

The other major danger posed by volcanic ashfall is that of respiratory problems. The inhalation of fine volcanic ash can cause a wide variety of respiratory problems, especially in older people.

Previous Occurrences
In 1980, an eruption of Mt. St. Helens in the state of Washington caused a fallout of ash in Glacier County and in Cut Bank. While no reports of structure damage were received, it did cause health problems for some people.

Vulnerability
The likelihood of a major eruption occurring in a location close enough to Glacier County to have major effects is low, but it is impossible to estimate the probability of volcanic eruptions. Glacier County is east (in the direction the wind almost always blows) of a number of active volcanoes, so it is theoretically possible to have major ash fall problems at any time. Because only one such occurrence is known to have happened in the area during our time of records, the likelihood of a major ash fall event in any one year is quite low.

3.1.10 Wildfire

General

A wildfire is any unplanned fire, including grass/range fires, forest fires, and scrub fires caused by humans or natural in origin. Montana has a long history of severe, destructive wildfires. Negative impacts of wildfires include loss of life, property, and natural resources; severe emotional crisis; widespread economic impact; disrupted and fiscally impacted state and local governments; and environmental degradation.

Wildland/urban interface is defined as the zone in which structures and vegetative fuel intermingle. This can include the edges of communities surrounded by agricultural lands or clusters of structures built into forested areas. In recent years, more and more people are moving into interface areas, increasing the danger to their structures and causing the fight against wildfires to be more dangerous.

Lightening, improper burning, and the railroad are all common causes of fire in Montana. Dry conditions and high winds exacerbate wildfires, and both of those are common in Glacier County. Wildfire is also particularly dangerous in mountainous areas, as the heat radiates up slopes (burning faster) and the terrain makes it more difficult to contain.

Previous Occurrences

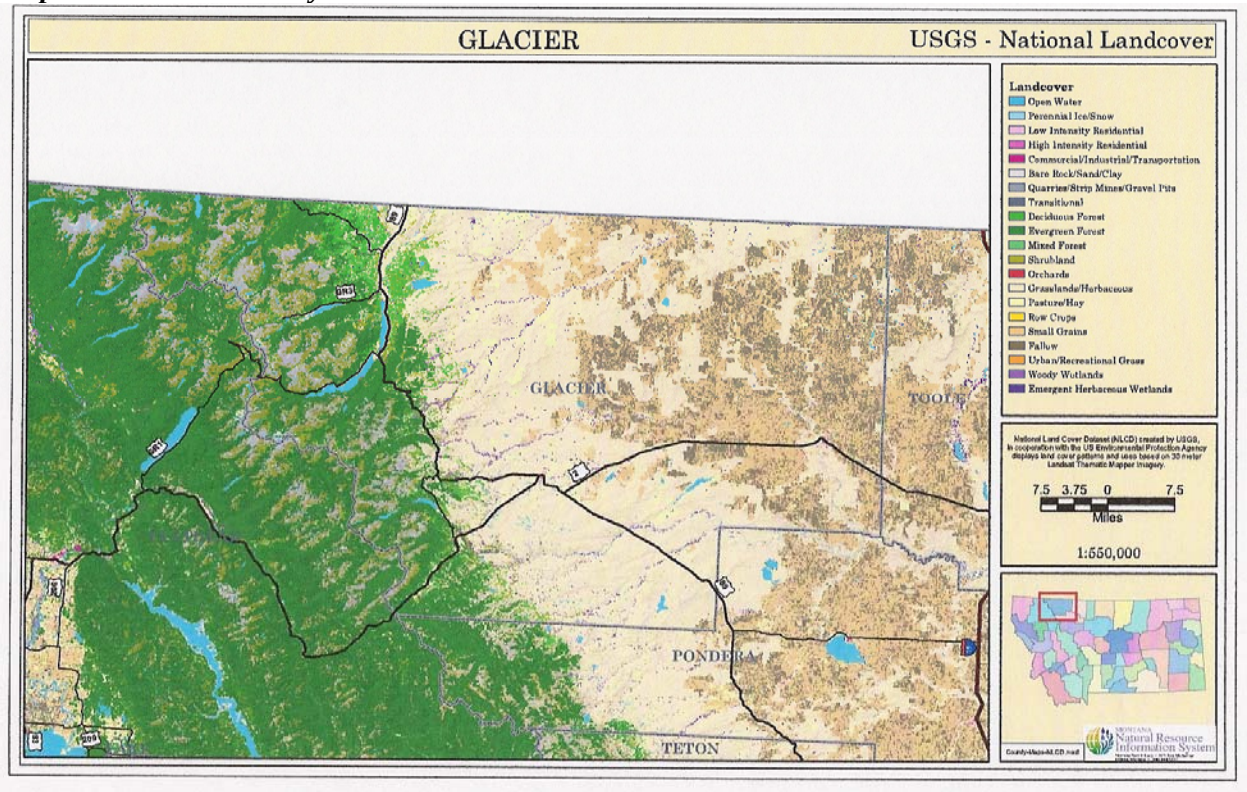
Wildfires occur nearly every year in some part of Glacier County, some burning as many as 9,000 acres. Luckily, it is only on very rare occasions that wildfires have caused severe economic damages. One such case, in 1998, cause $5.5 million damages.

It is common, however, for people to die every year from the hundreds of fires that occur throughout the state. Houses, electrical transmission lines and other properties are also destroyed every summer.

Vulnerability

Wildfire is a major hazard in Glacier County. It will very likely occur in any given year, and has the potential to cause huge amounts of damage. The western end of the county is most at risk of wildfires. Referring to ***Map 3-3*** (page 20) and ***Map 3-5*** (groundcover), one can see that this area has both steep slopes and much vegetative fuel.

Map 3-5 Glacier County Groundcover



Luckily, very few structures have been built in vulnerable locations (Map 3-4, page 20), but current trends are causing people to build more often in at-risk areas. It is also possible—though highly unlikely—that a wildfire could move into Cut Bank and cause incredible damages and many injuries and deaths.

3.1.11 Windstorms

General

Windstorms have the potential to cause widespread destruction, injury, and even deaths. Strong winds can tear the roofs off structures and even collapse buildings, but the greatest danger in windstorms is flying debris. Airborne objects can break windows or even walls and severely injure people, and blowing dust or snow can reduce visibility to zero, making driving or any outside activity very dangerous.

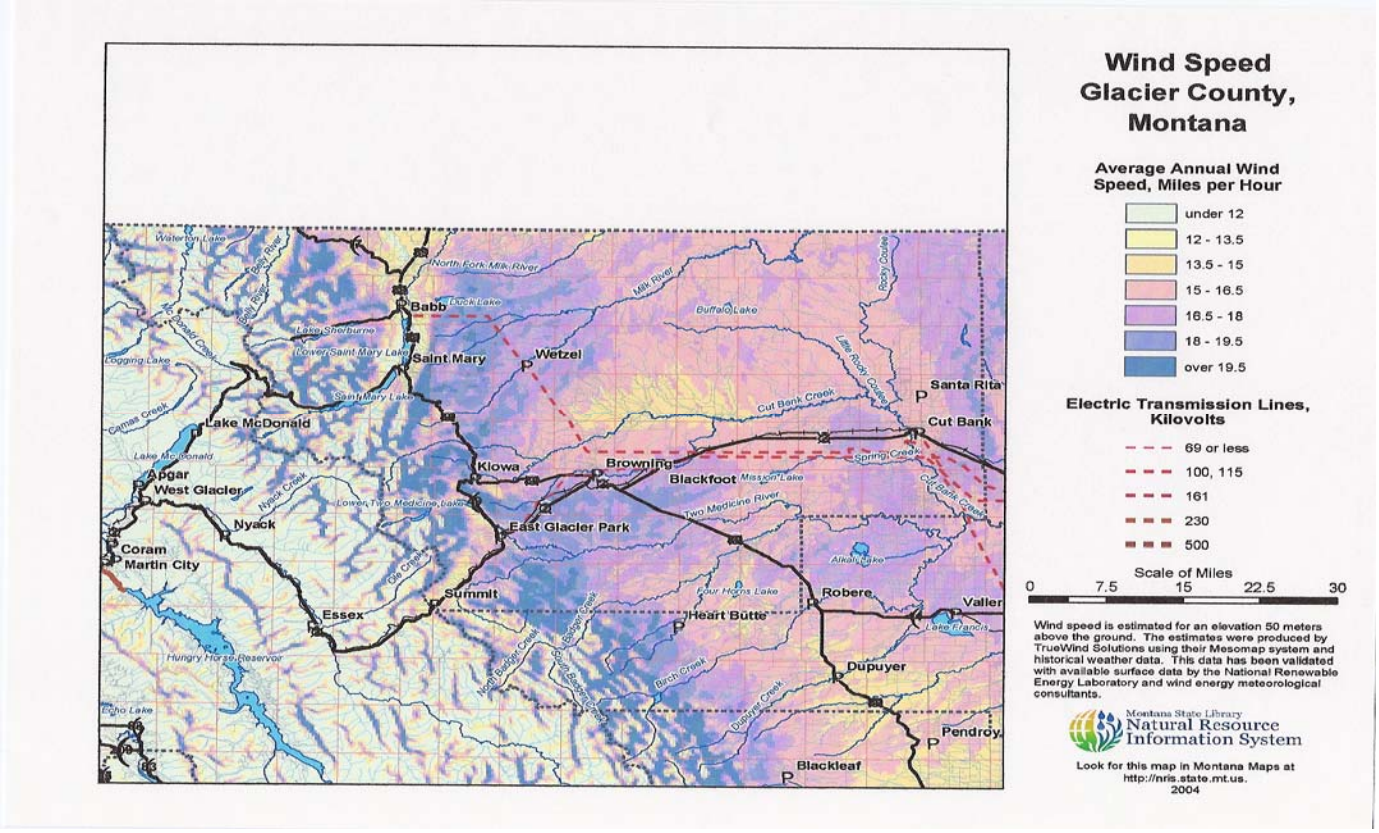
Previous Occurrences

Windstorms occur more frequently in Glacier County than any other dangerous natural phenomenon. Since 1990, the County and City of Cut Bank have averaged three windstorms per year with property damage into the millions. In at least two cases (1992 and 1976), dozens of train cars were blown of the tracks. Historical accounts list windstorms rated at more than 100 miles per hour that broke out windows, tore roofs off buildings, toppled trees and injured many people.

Vulnerability

As demonstrated above, the likelihood of windstorms in Glacier County is great. We can expect windstorms nearly every year, especially in the western parts of the County. This can be seen on ***Map 3-6***, which shows average wind speeds over Glacier County.

Map 3-6 Glacier County Average Wind Speed Map



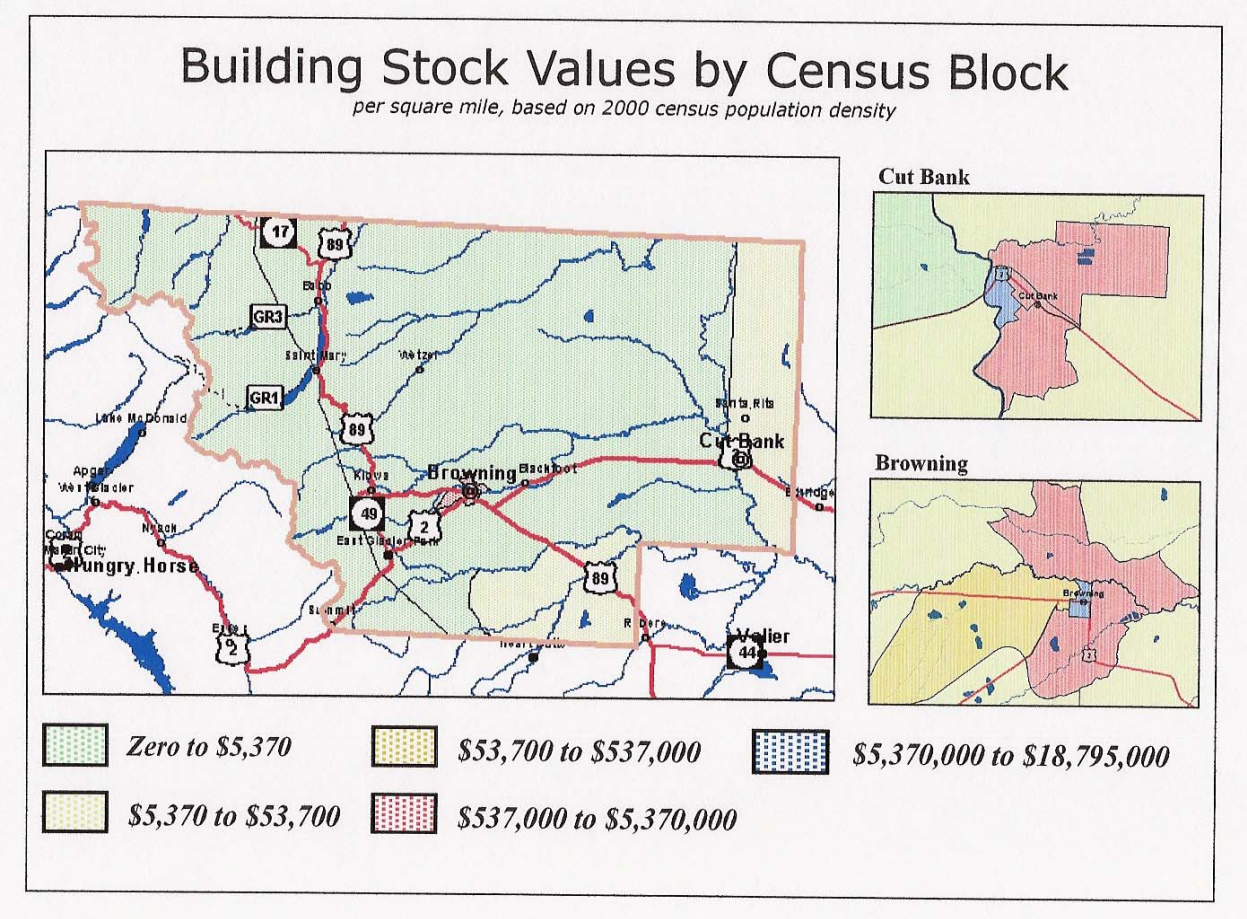
3.2 Assessing Vulnerabilities

An assessment of the County's vulnerabilities requires an understanding of what the community values. For the purposes of this project, building values, critical infrastructure, growth trends and vulnerable populations were considered.

3.2.1 Building Values

Because of the rural nature of Glacier County, information about building stock values in different parts of the County is not available. By analyzing the population of each census block, however, we can come up with a reasonable estimate of the average building stock values in different parts of the County. Using census data from the Montana State Library and known building values in certain locations, we were able to get a general idea of the building stock values for the entire County. This information was supplemented and modified using the County GIS maps recently made for E-911 addressing. ***Map 3-7*** shows our estimated building stock values by census block.

Map 3-7 Glacier County Building Stock Values by Census Block



3.2.2 Critical Facilities and Infrastructure

Critical facilities are of particular concern because they provide essential products and services that are necessary to preserve the welfare and quality of life and fulfill important public safety, emergency response, and/or disaster recovery functions.

Critical facilities are defined as facilities critical to government response and recovery activities (i.e. life safety and property and environmental protection). These include: 911 emergency call centers; police and fire stations; emergency operations centers; public works facilities; sewer and water facilities; shelters; hospitals; bridges and roads; and facilities that, if damaged, could cause serious secondary impacts (i.e. hazardous materials storage units). Critical facilities also include those facilities that are vital to the continued delivery of community services or have large vulnerable populations. These facilities may include: the jail, the courthouse, public service buildings, nursing homes, retirement centers and schools. ***Appendix D*** includes lists of critical facilities in Glacier County.

Critical facilities listed in ***Appendix D*** were identified by the Steering Committee and addended, corrected and refined in Planning Committee meetings.

3.2.3 Future Growth and Land Use Trends

The population of Glacier County has varied greatly over the years, mainly in response to the booms and busts of the oil and gas industry. Some years showed better than 5% growth in population, but Glacier County lost population throughout much of the 1970s. Today, Glacier County shows almost no growth, positive or negative. The US Census currently estimates the County will add about one person per year to the population, a growth rate of 0.0075 percent.

Agriculture is the basis of the Glacier County economy. The production of both livestock (beef cattle, sheep, swine and chickens) and crops makes up the majority of jobs and county income. This trend is also expected continue.

At this time there is some new development happening in Glacier County or Cut Bank, and the jurisdictions currently do not have strategic growth plans or goals.

3.2.4 Vulnerable Populations

A disaster is often felt most strongly in the way that it affects the population of the jurisdiction. Not all parts of the population, however, are equally capable of caring for themselves in disasters. Certain groups of people are more vulnerable than others, and they have been identified here as vulnerabilities of the County in general.

Some of these populations are centered in one location but with a revolving set of individuals (e.g. hospital, school). Other groups are spread throughout the County with more static memberships. These include the elderly, disabled, and homebound individuals.

Table 3-1

Vulnerable Populations – Hospitals and Nursing Homes	
Facility	***Address***
Northern Rockies Medical Center	802 2nd Street SE, Cut Bank
Glacier County Nursing Home	802 2nd Street, SE, Cut Bank
BeeHive Homes	12 4th Ave SE, Cut Bank

Table 3-2

Vulnerable Populations – Schools	
Facility	***Address***
Cut Bank High School	312 1st Street SE, Cut Bank
Anna Jeffries Elementary School	116 2nd Street NW, Cut Bank
H.C. Davis Elementary School	20 2nd Avenue SE, Cut Bank
Cut Bank Middle School	116 3rd Avenue SE, Cut Bank

Table 3-3

Vulnerable Populations – Retirement Facilities	
Facility	***Address***
Pine Treet Apartments	229 2nd Avenue SE, Cut Bank
Cut Bank Villas	33 1st Avenue SE, Cut Bank
Glacier Ridge	520 2nd Street SW, Cut Bank

3.3 Geographical Irregularities

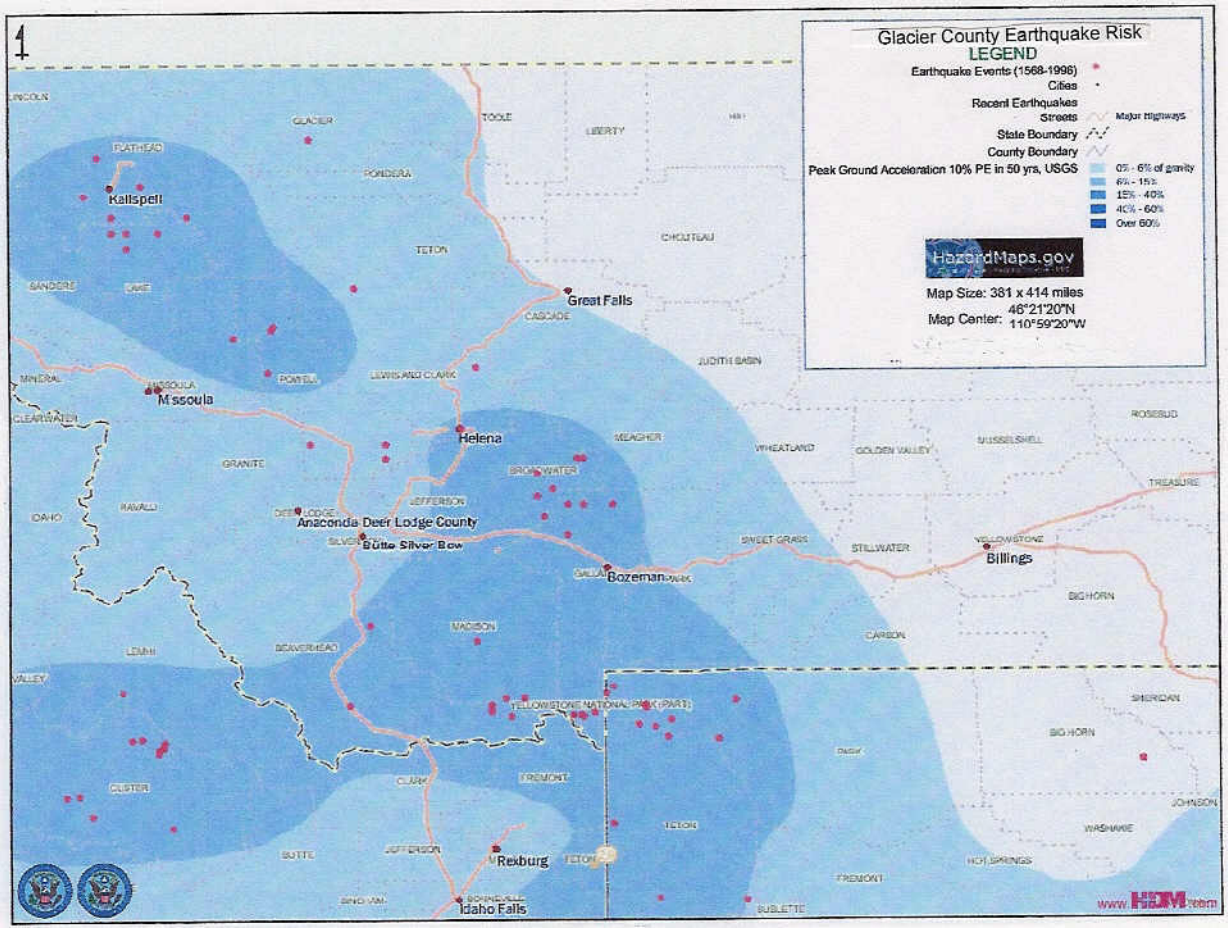
The different areas of Glacier County have significantly unique characteristics that they should be noted here. These irregularities include disparate population densities, varying slope and rainfall, and proximity to hazard areas. For purposes of this plan, we will speak of western Glacier County as that part west of the Blackfeet Nation, and eastern as that to the east of the Blackfeet National boundary.

3.3.1 Hazards

The majority of the hazards that threaten the County are as likely to happen in one part of the County as the next. There are, however, some notable exceptions. These include: earthquake, flood, landslide and wildfire. Each of these will be addressed in turn.

Map 3-8 shows Glacier County's earthquake risk. This map depicts earthquake hazard by showing, by contour values, the earthquake ground motions that have a common given probability of being exceeded in 50 years. Earthquake is not a major hazard for most of the County, but western Glacier County is much more likely to experience significant damage due to an earthquake. The real risk comes from the higher risk zone surrounding Kalispell and Flathead County. An earthquake that affects the western part of the county is likely to be felt in the rest of the County, but as one moves east, away from the likely epicenter, the peak ground acceleration, and therefore damage, will likely decrease proportionately.

Map 3-8 Glacier County Earthquake Risk



Western Glacier County is also somewhat more likely than the rest of the County to experience flooding. Referring back to ***Map 3.1*** (page 16), one can see that the far western end of the county receives 2 two 4 times as much precipitation as the eastern end. Snow accumulation and subsequent snowmelt, heavier rains, and steeper slopes make floods, and especially flash floods, much more of a risk to the western portion of the County. It should be noted, however, that flooding is still likely to occur at least every few years in all parts of the County.

With very few exceptions, only the far western end of the County is at risk for landslides. This are is, however, very lightly populated, so landslides there are notable mainly for their environmental impact.

Severe wildfires are also somewhat more likely to strike the western portion of the County. As it is the only heavily forested part of the County, it is the only area that forest fires, the most intense and dangerous wildfires, can occur. One must note that all of the rest of the County, however, is equally at risk of range fires, especially during times of drought, and severe winds can make those fires incredibly dangerous.

3.3.2 Economic Resources

There are two aspects to economic resources in the County. These are structures (houses and other buildings, electric substations, pipeline pump stations) and environment-related (crops, rangeland, trees).

Map 3.7 (page 25), which shows building stock values, shows that most of the county's value in structures is located in and around Cut Bank. The eastern end of the County includes most of the County's oil resources and assorted pipelines, most of the electric substations, and all government buildings. Approximately 60 percent of all of the County's structures are in Cut Bank alone.
Environment-related economic resources, however, are much more evenly distributed. Much of the land in the County is ranchland, with some patches of cultivated ground and some wilderness areas mostly on the western end of the County.

3.3.3 Critical Facilities

Nearly all of the County's critical facilities are located in Cut Bank, including two grocery stores, government buildings, restaurants, phone and radio infrastructure, a medical facility, public schools, the airport, and local media sources.

A full list of critical infrastructure can be found in ***Appendix D.***

3.3.4 Vulnerable Populations

There are a number of different vulnerable populations in the County, and depending on the type of population, they have very different distributions. A number of the more significant populations and population types will be discussed below.

The largest vulnerable population in the County is the elderly. They are distributed across the County at approximately the same ratio as the general population, with a slightly higher percentage of them living in Cut Bank (due to the nursing home and retirement centers).

The second largest vulnerable population is children. Younger children are especially at risk, as they are less able to take care of themselves. This group is rather more complicated to deal with, as they are sometimes in school, some are at day care centers, some are visiting friends, and where they are at any given time is dependent on the time of year, weather, and numerous other factors. In general, it can be said that the distribution of the youth is roughly similar to that of the elderly, with a slight majority located in Cut Bank. During school hours, most of them will be in schools.

3.4 Problem Statements

The following problem statements were developed by the Steering Committee to present along with the hazard analysis to the Planning Committee. These problem statements are community risks derived from the hazard and vulnerability study presented above.

1. A dam failure, though very unlikely, could have catastrophic affects on the County and wash out many roads and bridges.

2. Flooding is likely to damage crops and structures anywhere along countless waterways in the County.

3. Drought is currently a major problem in the County, and has historically caused major problems for agriculture and for Cut Bank water supplies.

4. A number of earthquake zones run through the County. It is unlikely that a major earthquake would occur in the County, but several 4.0 and greater earthquakes have taken place in the county in the last 20 years. Older non-wood frame buildings in both Cut Bank and the County would be at most risk of damage.
5. Hail is likely to occur in any given summers. A huge amount of crop damage will be the biggest problem in most hailstorms, followed by damage to vehicles and broken windows in both vehicles and structures both in Cut Bank and rural areas of the County.

6. Severe windstorms occur often in the County usually with little warning. All structures in the County and Cut Bank are at risk, most notably to roofs, windows, signs and trees.

7. Any structure in the County is technically at risk of wildfire if the conditions were right, There is a major hazard for structures due to forest fires in the western end of the County.

8. Severe winter storms are a major hazard in the County, and all structures and individuals in the County and cities are at risk. The damages such a storm could cause are innumerable, and include power outages, structure damage, injury or death to persons and animals, crop damage, and damage to city/county infrastructure.

9. Few businesses, city offices or individuals in the County have access to NOAA weather radios or other reliable emergency warning systems.

10. Glacier county averaged 21 damaging weather events each year since 1990. These storms resulted in $10,400,000 in property damage and $5,100,000 in crop damage. This information was furnished by the National Weather Service.

3.5 Summay

This risk assessment represents an approximate history and estimated vulnerabilities to the Glacier County and Cut Bank from the hazards identified. As with any assessment involving natural or man-made hazards, all potential events may not be represented here and an actual incident may occur in a vastly different way than described. This assessment, however, will be used to try to minimize damages from these events in the future.

4.0 Mitigation Strategy

This section outlines the strategy that Cut Bank and Glacier County will take when considering possible mitigation projects. All parts of this strategy were formulated in public meetings of the Planning Committee and further developed as input and reaction to the goals and objectives was processed.

4.1 Hazard Prioritization

To gain a better understanding of the affects of the hazards and the risks they pose, all of the above information was combined with the hazard and vulnerability assessment data into Table 3-1 below. Each hazard discussed above was assigned a frequency rating based upon how often an event is likely to occur. The rating was based on a scale of 1 to 10. A rating of 1 means that a significant event of that type is likely to occur at least once in a given year. A rating of 10 means that the event is will likely occur only once in any given 10-year period. Any that are likely to occur less than once in ten years is rated 10.

The likely impact of each event was then calculated on two different scales. The first was the human impact. Likely human impact was then rated on a scale of 1 to 10, with 1 being very little chance of injuries or deaths related to the event and 10 being a very good chance of injuries or deaths.

Economic impact was rated in a very similar way, on a scale of 1 to 10 with 1 designating very little economic impact and 10 designating a very serious economic impact. A ten was given to the most damaging historical event (dam failure) and the others were scaled accordingly using historical data and estimates of potential future impacts. (Both human and economic impact scores are completely unrelated to the likelihood that an event of the type in question will occur.)

Finally, the above numbers were inserted into the following algorithm to determine each hazard's impact rating: [(*Human Impact*) + (*Economic Impact*)] / (*Hazard Frequency*)

Table 4-1 Prioritization Algorithm

		Likely Impact:		
Hazard	**Frequency***	**Human****	**Economic*****	**Rating********
Severe Winter Storms	1	6	5	11.0
Windstorms	1	4	6	10.0
Flood	3	8	8	5.3
Wildfire	1	2	3	5.0
Hailstorms	2	1	9	5.0
Drought	2	1	8	4.5
Dam Failure	10	8	9	1.7
Tornado	7	3	4	1.0
Earthquake	8	1	3	0.5
Volcanic Ashfall	10	2	2	0.4
Landslide	10	1	1	0.2

Each of the components of the algorithm were then charted to provide a broader understanding of this information.

Chart 4.1 Hazard Frequency

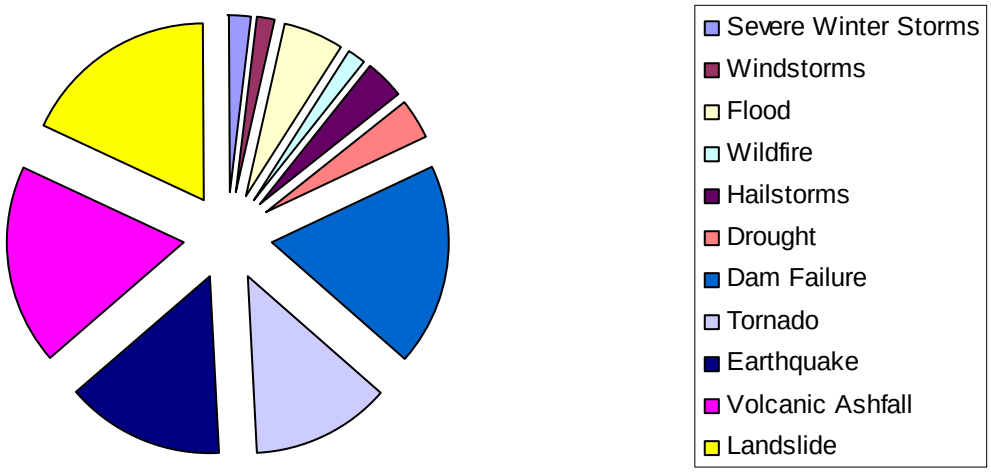


Chart 4.2 Human Impact

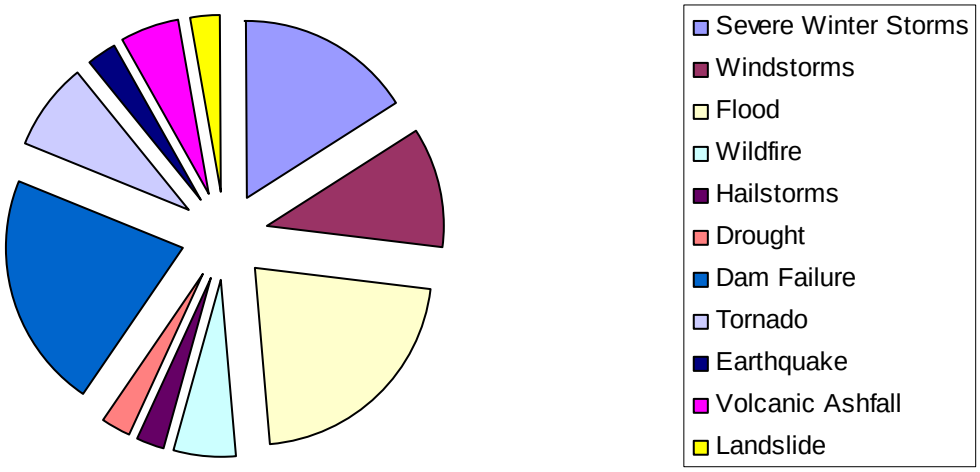


Chart 4.3 Economic Impact

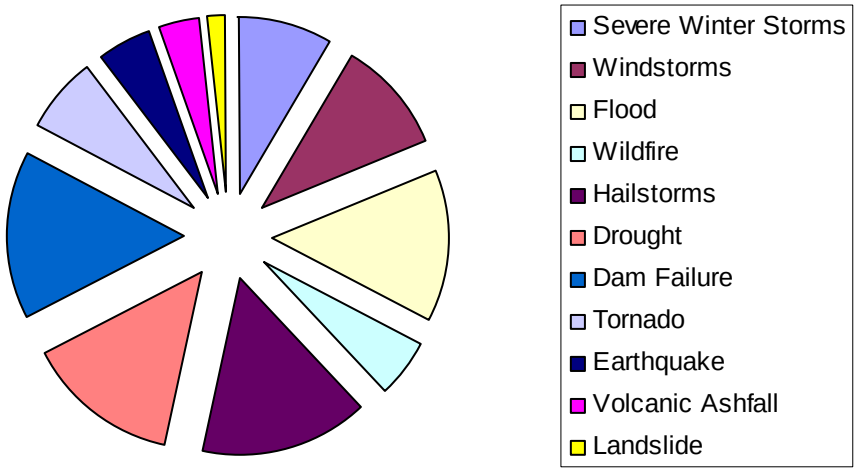
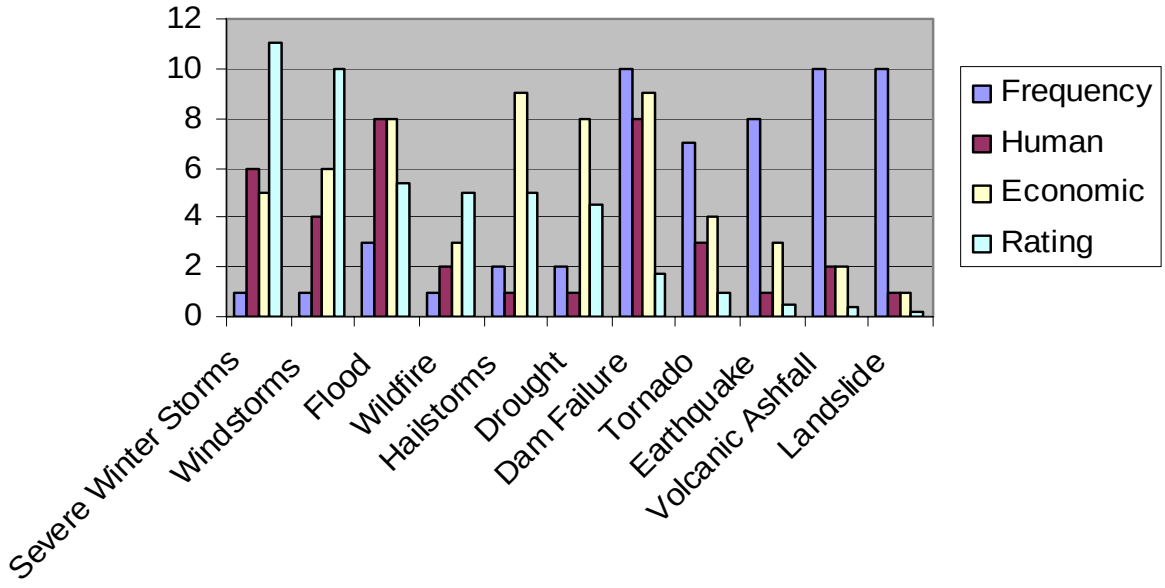


Chart 4.4 Overall Hazard Prioritization



4.2 Local Hazard Mitigation Goals and Action Plan

Late in 2003, the Mitigation Planning Committee held a public meeting at which the hazard analysis was presented. The following goals and objectives were selected after discussion of the hazard analysis. This particular selection of goals addresses most if not all of the major natural hazards that could affect the county. At later meetings, these were revised as necessary and another goal with objective was added.

DES and the Steering Committee then began a discussion of possible specific action steps that could be taken to meet the objectives listed under each goal. The Planning Committee had a number of other ideas, and eventually the following list of priorities was selected. (Note: each priority is followed by one or more numbers and letters. These specify which objectives are addressed by that particular action step priority.)

Goal 1: Protect the citizens of Glacier County and Cut Bank from the effects of extreme weather. (Severe winter storms, windstorms, hailstorms)

Objective 1.1: Prepare the general public for severe weather.

Action Items:
Conduct educational awareness programs on severe weather and associated risks.
Conduct educational awareness programs on developing a family disaster plan.
Conduct educational awareness programs on preparing disaster supply kits.
Promote awareness of the local NOAA Weather Radio station.
Promote awareness of the benefits of owning NOAA Weather Radios.
Coordinate with volunteer agencies regarding sheltering during severe weather.

Responsible Agency: DES

Objective 1.2: Increase to at least 25% the number of public buildings and businesses in Conrad, Valier and elsewhere in the county that are equipped with NOAA weather radios capable of issuing Emergency Alert System warnings and broadcasts.

Action Items:
Identify public buildings and businesses to participate.
Identify funding sources for purchase of radios.

Responsible Agency: DES

Objective 1.3: Prepare vulnerable populations for severe weather.

Action Items:
Work with special needs populations on alternative heating systems.
Assist special needs facilities in the development of disaster supply kits.
Assist special needs facilities in the development of emergency plans.
Assist special needs facilities in acquiring NOAA Weather Radios.
Coordinate with facilities regarding sheltering needs.

Responsible Agency: DES, Hospital, Nursing Home, BeeHive, Group Homes, Schools

Goal 2: Protect property and structures in the flood prone areas of Glacier County and the Cities of Cut Bank

Objective 2.1: In two years, increase by 25% the number of properties in the flood prone areas with coverage under the NFIP.

Action Items:
Conduct educational awareness of NFIP with the general public.
Insure realtors are aware of and routinely promote NFIP.

Responsible Agency: DES

Objective 2.2: Develop policies regarding development in flood prone areas.

Action Items:
Mapping of all areas prone to flooding.
Develop countywide growth plan.
Develop land use policies.

Responsible Agency: County Commissioners, Mayors/City Councils, Planning Boards

Objective 2.3: Prevent losses to Glacier County infrastructure from flooding.

Action Items:
Survey existing culverts to insure appropriate size.
Install culverts in areas where flooding could cause potential significant losses.

Responsible Agency: Road Dept, Cut Bank Public Works

Goal 3: Ensure a secure supply of potable water for the Cut Bank during times of drought.

Objective 3.1: Develop funds and public impetus to improve Cut Bank's water intake system.

Action Items:
Identify funding sources.
Develop public/private partnerships.

Responsible Agency: Cut Bank Mayor/City Council/Public Works

Goal 4: Protect citizens and property of Glacier County and Cut Bank from the devastation of wildfires and structure fires.

Objective 4.1: In two years, increase by 25% the number of landowners taking proactive measures to reduce the risk of wildfire.

Action Items:
Promote such educational programs as Firewise.
Continue efforts to put smoke alarms in all residences, businesses, facilities.
Assist the public to develop defensible space around dwellings/farm buildings
Promote best management practices for crop and rangeland.

Responsible Agency: Cut Bank Fire Department, DES, Chief Elected Officials, rm Services Agency

Goal 5: Minimize losses to existing and future structures within hazard areas.

Objective 5.1: Develop policies regarding development in hazard prone areas

Action Items:

Review existing laws, building codes and/or land development ordinances to determine if new legislation or amendments are needed.
Develop countywide growth plan.
Develop land use policies.

Responsible Agency: County Commissioners, Mayors/City Councils, Planning Boards

Goal 6: Prevent potential damage from earthquakes.

Objective 6.1: Assist the public to better understand the earthquake risk.

Action Items:
Education awareness for the general public on earthquake hazards.
Education for the general public on steps they can take to mitigate damage.

Responsible Agency: DES

Objective 6.2: Assist schools/daycares to protect students from earthquake hazards.

Action Items:
Promote use shatter-proof window/tie down techniques.
Promote earthquake hazard hunts and steps to mitigate identified hazards.
Educational awareness on earthquake safety.

Responsible Agency: Schools, DES

*****Note: Cut Bank is a small town that is well integrated with the larger community of Glacier County. Furthermore, Cut Bank is vulnerable to the same hazards, to roughly the same degree, as the rest of the County. No goals or objectives were identified by either the Steering or Planning Committee that were specific to any one jurisdiction. All of the possible goals, objectives and projects—and especially those seen as most beneficial—were perceived as being the most beneficial for both jurisdictions. Therefore, specific projects were not identified for each jurisdiction, but all of those identified were determined practicable for the entire County and Cut Bank.

To ensure that community goals and other factors are taken into account when prioritizing projects, a cost benefit matrix that uses the following factors has been developed: cost (including management costs), feasibility (politically, socially, and environmentally), population benefit, property benefit, and community priorities.

Each of the factors was ranked low, moderate, or high for each of the projects. The methods used to assign a category and the associated score can be defined as follows:

Cost (including management):	3 Score	Low < $10,000
	2 Score	Moderate $10,000-$50,000
	1 Score	High >$50,000
Feasibility:	1 Score	Low
(politically, socially,	2 Score	Moderate
environmentally)	3 Score	High
Population Benefit:	1 Score	Low < 25% of population to benefit
	2 Score	Moderate 25%-75% of population to benefit
	3 Score	High > 75% of population to benefit

Property Benefit:	1 Score	Low < 25% of property to benefit
	2 Score	Moderate 25%-75% of property to benefit
	3 Score	High > 75% of property to benefit
Community Priorities:	1 Score	Low - Priority 11-18 Hazards
(Comment at public meetings)	2 Score	Moderate - Priority 4-10 Hazards
	3 Score	High - Priority 1-3 Hazards

The overall cost-benefit was then calculated by adding the total score for each project. A summary of the scores for each of the proposed projects can be found in ***Table 4.2***.

Table 4-2

Proposed Actions and Prioritization						
Goal 1: Protect the citizens of Glacier County and Cut Bank from the effects of extreme weather, including severe summer and winter storms, windstorms, hailstorms						
Project	*Cost*	*Feasibility*	*Population Benefit*	*Property Benefit*	*Community Priorities*	*Score*
Education Program on Severe Weather / Risks	Low	High	High	Low	High	13
Education Program for Family Disaster Plan / Disaster Supply Kits	Low	High	High	Low	High	13
Education Program on NOAA Weather Radio	Low	High	High	Low	High	13
Sheltering Program	Low	High	Low	Low	High	11
Heating Systems for Special Needs Facilities	High	High	Low	Low	High	9
Emergency Plans for Special Needs Facilities	Low	High	Low	Low	High	11
Disaster Supply Kits for Special Needs Facilities	Low	High	Low	Low	High	11
Goal 2: Protect property and structures in flood prone areas of Glacier County and Cut Bank						
Map flood prone areas	High	Moderate	Low	Low	Low	6
NFIP Education	Low	High	Moderate	Low	Moderate	11
Land Use Policies	Low	Low	Low	Low	Low	7
Countywide Growth Plan	Low	Low	Low	Low	Low	7
Culverts	Moderate	High	Moderate	Low	Moderate	10
Goal 3: Potable water during times of drought						
Improve water intake	High	Moderate	Moderate	Low	Moderate	8
Goal 4: Protect citizens from the devastation of wildfires and structure fires						
Firewise	Low	High	Moderate	Low	High	12
Smoke Detectors	Low	High	Moderate	Moderate	High	13
Defensible Space	Low	High	Moderate	Moderate	High	13
Crop/Rangeland Management Practices	Low	High	Moderate	Moderate	High	13
Goal 5: Minimize losses to existing and future structures within hazard areas						
Building Codes	Low	Low	Low	Low	Low	7
Land Development Ordinances	Low	Low	Low	Low	Low	7
Growth Plan	Low	Low	Low	Low	Low	7
Goal 6: Prevent potential damage from earthquake						
Education program for schools/daycares	Low	High	Low	Low	High	11
Shatterproof windows in schools/daycares	High	High	Low	Low	Moderate	8
Tie Down program for schools/daycares	Low	High	Low	Low	Moderate	10

4.3 Project Implementation and Legal Framework

After formal adoption of this plan by the Mitigation Planning Committee, Glacier County and the City of Cut Bank, and other agencies and organizations; Montana State Disaster and Emergency Services; and the Federal Emergency Management Agency (FEMA), the County and all participating organizations will be eligible for state and federal pre-disaster mitigation grant funding. All projects will be approved by the Mitigation Planning Committee and the local DES coordinator before implementation. The Local Emergency Planning Committee (LEPC) has the capacity to apply for, oversee, and evaluate these grants, and should be an active player in the mitigation process.

4.3.1 Implementation

Those actions that received the highest scores in Table 4-2 will be given the highest priority. As funding becomes available, the higher priority activities can be further prioritized. The goals and objectives list the agency responsible for implementation. Periodic meetings are to be held with the Planning Committee to update all involved of progress being made. The Planning Committee will be encouraged to assist in implementing the plan, engaging the community and locating monies that might be put to use in County mitigation projects. Both DES and the Planning Committee will seek out opportunities to build community knowledge of and participation in future mitigation planning efforts.

Table 4-3

Implementation Plan for Proposed Actions				
Project Description	*Jurisdiction*	*Responsible Agency*	*Potential Funding Source*	*Priority Score*
Education Program on Severe Weather / Risks	Glacier County Cut Bank	DES	Internal	13
Education Program for Family Disaster Plan / Disaster Supply Kits	Glacier County Cut Bank	DES	Internal	13
Education Program on NOAA Weather Radio	Glacier County Cut Bank	DES	Internal	13
Smoke Detectors	Glacier County Cut Bank	Fire Departments	Internal	13
Defensible Space	Glacier County Cut Bank	Fire Departments DES	Internal	13
Crop/Rangeland Management Practices	Glacier County Cut Bank	Commissioners FSA	Internal	13
Firewise	Glacier County Cut Bank	Fire Departments DES	Internal	12
Sheltering Program	Glacier County Cut Bank	DES Commissioners	Internal	11
Emergency Plans for Special Needs Facilities	Cut Bank	Facilities DES	Facilities	11
Disaster Supply Kits for Special Needs Facilities	Cut Bank	Facilities DES	Facilities	11
NFIP Education	Glacier County	DES	Internal	11

Education Program for Schools/Daycares	Cut Bank	School Districts Day Care Centers DES	School Daycares	11
Culverts	Glacier County Cut Bank	Commissioners Road Department Public Works	Internal	10
Tie Down Program for Schools/Daycares	Cut Bank	School Districts Day Care Centers	Schools Daycares	10
Heating Systems for Special Needs Facilities	Cut Bank	Facilities	Facilities	9
Improve water intake	Cut Bank	Public Works Mayor of Conrad	Internal Grants	8
Shatter-proof windows In schools/daycares	Cut Bank	School Districts Day Care Center	Schools Daycares	8
Building Codes	Glacier County Cut Bank	Commissioners Mayors Planning Board	Internal	7
Land Development Ordinances	Glacier County Cut Bank	Commissioners Mayors Planning Board	Internal	7
Growth Plan	Glacier County Cut Bank	Commissioners Mayors Planning Board	Internal	7

4.3.2 Legal Framework

The authority of Disaster and Emergency Services and the Mitigation Planning Steering Committee to implement the mitigation planning process in Pondera County is derived from a number of federal and state statutes and local ordinances. They are as follows:

Federal

- "The Federal Civil Defense Act of 1950"
- Public Law 96-342, "The Improved Civil Defense Act of 1980"
- Public Law 91-606, "Disaster Relief Act"
- Public Law 93-288, "The Robert T. Stafford Disaster Relief Act of 1974"

State

- Montana Code Annotated (MCA), Title 10, Chapter 3
- MCA, Title 76, Chapters 2, 3 and 5

Local

No local ordinances currently exist which would apply to this document.

5.0 Plan Maintenance Procedures

This plan is meant to be a living document. As such, it is necessary to have procedures in place for its periodic maintenance. These are addressed in this section.

5.1 Monitoring, Evaluating and Updating the Plan

The Glacier County Mitigation Plan will be reviewed every two years, or as new hazards present themselves. The plan should be updated every five years, or more often if necessitated by the review or fulfillment of objectives.

It is the responsibility of the local DES coordinator to commence the review and updating process by calling meetings of the Planning Committee and ensuring that the public is aware of those open meetings. Should the DES coordinator find at any time that new hazards have emerged that may affect the plan, or that the top priorities no longer seem as important or timely, he/she may call together the Planning Committee for a review of the plan.

At least once every five years an updated version of this plan will be submitted to the State Hazard Mitigation Officer by the local DES coordinator for review and, ultimately, acceptance by FEMA. The DES coordinator will notify all members of the Planning Committee when changes have been accepted.

5.2 Continued Public Involvement

Final versions of this plan will be circulated throughout the community and will be approved by the Planning Committee in a public meeting prior to its submission to the State Hazard mitigation Officer. Public meetings of the Planning Committee will be held as part of the review process at least every two years, and the DES coordinator will public notices in the local media upon completion of any of the objectives listed herein.

Appendix A: Signed Resolutions

Appendix B: Steering Committee and Planning Committee Contact Lists

Mitigation Planning Steering Committee Membership List

Cindy Mullaney	Pondera County DES Coordinator	271-4040
Jim King	Glacier County DES Coordinator	873-2084
Darrell Stafford	Liberty & Toole County DES Coordinator	450-8972
Justin M. Schumacher	DES VISTA, North Central Montana	271-4044
Mark Keller	Blackfeet DES Coordinator	338-7521

Glacier County Mitigation Planning Committee Membership List

Appendix C: Meeting Documentation

Jim,

I'm sending copies of your attendance sheets to put in this section. Also any minutes from your local meetings should go here and I've also sending copies of steering committee meeting mintues.

Appendix D: Hazard Assessment Worksheets